

NEST TREE, HABITAT SELECTION AND PRODUCTIVITY OF SEVEN NORTH AMERICAN RAPTOR SPECIES BASED ON THE CORNELL UNIVERSITY NEST RECORD CARD PROGRAM

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Abstract

Nesting habitat and egg and nesting productivity are summarized from the North American Nest Record Card Program (Cornell University) for seven raptors of the Ottawa National Forest, Michigan. Summaries for the midwestern United States and the North American continent for the Barred Owl, the North American Accipiters, the Red-shouldered Hawk, Northern Harrier and the Merlin used all available data from the initiation of the card program through the fall of 1978.

Introduction

Presented here is a select subset of literature review on the management opportunities for seven raptor species of the Ottawa National Forest, Michigan. We present data summaries on nest tree, nesting habitat selection, and egg and nestling productivities for the Barred Owl (*Strix varia*), the three North American accipiters (*Accipiter gentilis*, *A. cooperii*, and *A. striatus*), the Red-shouldered Hawk (*Buteo lineatus*), Northern Harrier (*Circus cyaneus*), and the Merlin (*Falco columbarius*). Data in this paper are strictly from the Cornell University North American Nest Record Card Program. We were attracted to this data base because literatures revealed a void of the data necessary for understanding raptors of the Ottawa National Forest study area and sufficient for assessing the effects of land management practices on these species.

Methods

Information on nesting habitat selection and productivity of each raptor species was summarized from nest record card files, Cornell Laboratory of Ornithology. The entire data base for each species, from the inception of the card file to October, 1978, is summarized in this paper. Raptor productivity for purposes of this investigation was defined as any measure of reproductive potential including number of eggs, nestlings, or fledglings.

Because cards were mostly filed by amateur ornithologists and lay persons, a disparity of information existed as shown by differences in sample sizes among the parameters. We used card information strictly as presented, including use of plant common names, and nesting habitat types. We have purposely not added our interpretational biases by trying to define what we believe habitat types are like. We refer readers to Gleason (1952) Vines (1976) and Hitchcock and Cronquist (1978) for taxonomic nomenclature for tree species listed in this document.

TABLE 1
Tree Species and Species Groups
Used by Nesting Barred Owls

	North America		Midwest	
	Total #	% of Total	Total #	% of Total
DECIDUOUS:				
Elm	7	21	4	21
Hickory	2		2	
Aspen	1		1	
Beech	5	15	3	18
Sycamore	1		1	
Maple	5	15	3	18
Yellow Birch	1		1	
Oak	2		2	
Sweetgum	3			
Subtotal:	29	88	17	100
CONIFEROUS:				
Cypress	4	12	0	0
Subtotal:	4	12	0	0
TOTALS:	33	100	17	100

To lend relevance to our investigations of these species in the Ottawa National Forest, data were summarized into midwestern and North American geographical levels. Midwestern states included: Michigan, Minnesota, Wisconsin, Illinois, Indiana, Ohio, and Pennsylvania.

Results

Barred Owl

Nest Tree and Habitat Selection

Of the 10 tree species or species groups used by nesting Barred Owls in North America, the same 3 were preferred over North America and in the midwest (Table 1). Over North America, elm was used most frequently followed by beech. Midwestern conifers apparently were not used. Data show cypress was the only conifer used. Unidentified oaks, hickories, yellow birch, sycamore, and aspen were also occasionally used for nesting in the midwest. Barred Owls most frequently nested in cavities in live or dead "large old trees".

Deciduous woodland habitats, specifically riparian and lowland areas, were most frequently chosen (Table 2). "Pure coniferous forest habitats" were not recorded in the midwest, and only infrequently over North America for nesting. Mixed forests were used; unidentified deciduous trees in such forests provided the most frequently used nest sites in the midwest. Throughout North America, so called "virgin forests" and "large trees in mixed woods" provided frequent nesting sites. Few nested in abandoned nests of Red-shouldered Hawks, Red-tailed Hawks, Cooper's Hawks, and Goshawks, especially in areas with young timber.

TABLE 2
Barred Owl Nesting Habitat Preferences

	North America		Midwest	
	Total #	% of Total	Total #	% of Total
DECIDUOUS:				
Unidentified	14	28	4	50
Deep Forests Riparian & Lowlands	10	27	2	25
Subtotal:	24	65	6	75
CONIFEROUS:				
Unidentified	3	8		
Subtotal:	3	8	0	0
MIXED WOODLANDS:				
Unidentified Deciduous	3		2	25
Large Tree "virgin forest"	1			
Unidentified Mixed	5			
Subtotal:	10	27	2	25
TOTALS:	37	100	8	100

Nest Heights

Mean nest heights for Barred Owls (Table 3) approximated 30 ft. (range: 5-100) above ground.

Productivity

Average clutch sizes were the same in the midwest and over North America. Clutch sizes ranged from 1-3 eggs over North America and 1-4 eggs in the midwest with a mean of 2.2 eggs per nest. The number of nestlings averaged two per nest.

Sharp-Shinned Hawk

Nest Tree and Habitat Selection

Fourteen tree species or species groups were used by nesting Sharp-shinned Hawks (Table 4). Coniferous trees were favored over deciduous species (24%) over North America. In the midwest, only conifers were used. Eastern hemlock was most frequently used, followed by red pine, white pine and black spruce. Over North America, hemlock was the most important nest tree followed by pines (white, red, ponderosa) and douglas fir. Oaks (bur, water, and white), maple, poplar and willow, in order of importance, were also used as nest trees.

No deciduous forest habitats were used for nesting in the midwest (Table 5). However, mixed woodlands (55%) and pure stands of conifers (46%) were nearly equally as important habitats throughout North America. Nests in deciduous and coniferous woods were most frequent in "moist ravine forests" and "spruce-fir habitats". Nesting has occurred in northeastern United States red pine plantations.

TABLE 3

Nesting Heights (feet) Clutch Sizes, and Number of Nestlings
in the Midwest and over North America for 7 Raptors of the Ottawa National Forest, MI

Species: Geographical Level	Nesting Heights			Clutch Sizes			Number of Nestlings		
	$\bar{x} \pm \text{St.D.}$	Range	(N)	$\bar{x} \pm \text{St.D.}$	Range	(N)	$\bar{x} \pm \text{St.D.}$	Range	(N)
Barred Owl:									
Midwest	31.3±22.3	5-100	(26)	2.16±0.84	1-4	(11)	2.0 ±0.65	1-4	(20)
North America	29.6±18.75	5-100	(49)	2.2 ±0.78	1-3	(15)	2.02±0.78	1-3	(55)
Sharp-shinned Hawk:									
Midwest	31.6± 6.1	21.5-40	(35)	4.2 ±1.2	0-5	(11)	2.3 ±2.1	1-4	(4)
North America	30.4±13.7	5-60	(35)	3.9 ±1.3	0-6	(37)	2.7 ±1.5	1-6	(31)
Cooper's Hawk:									
Midwest	45.9±12.4	20-70	(50)	3.2 ±1.0	0-5	(37)	2.4 ±1.3	0-5	(17)
North America	39.1±14.6	15-80	(111)	3.5 ±1.0	0-5	(72)	2.8 ±1.1	0-5	(47)
Goshawk:									
Midwest	45.1±15.9	20-84.3	(23)	2.6 ±1.2	0-4	(14)	2.4 ±0.86	0-4	(21)
North America	38.6±12.8	20-84.3	(67)	2.7 ±0.88	0-4	(44)	2.6 ±0.81	0-4	(50)
Red-shouldered Hawk									
Midwest	42.6±12.1	20-80	(55)	3.2 ±2.4	0-4	(24)	2.8 ±1.4	0-4	(65)
North America	47.0±18.3	18-110	(274)	2.5 ±1.0	0-5	(101)	2.3 ±0.9	0-5	(307)
Merlin:									
Midwest	No Data			No Data			No Data		
North America	17.7±10.2	5-35	(18)	2.5 ±1.4	0-4	(6)	2.84±1.3	0-5	(21)
Northern Harrier:									
Midwest	Not Applicable			3.8 ±1.6	1-7	(78)	3.3 ±1.6	1-6	(65)
North America	Not Applicable			3.7 ±1.7	1-7	(428)	3.3 ±1.4	1-6	(349)

Nest Heights

Midwestern Sharp-shinned nests were slightly higher (32 ft.) in trees than the average height (30 ft.) over North America (Table 3). However, the maximum nesting height was lower in the midwest than over North America. Greater variability in North American nest heights resulted from the generally lower nesting heights of western and Canadian province boreal forest nests and higher nest heights in larger conifers of the Pacific northwest. Nests in conifers were within a few meters of the tree tops, generally appressed to the tree trunk at major limb nodes. Nests in deciduous trees were often located in branch points slightly below the tree top.

Productivity

Midwestern clutch sizes averaged slightly larger (4.2 eggs vs. 3.9) than over North America, while there were slightly more nestlings (2.7 vs. 2.3 birds per nest) over North America than in the midwest. Maximum clutch size over North America was 6 eggs; 5 in the midwest. Maximum number of nestlings was 6 over North America and 4 in midwest states.

TABLE 4
Tree Species and Species Groups
Used by Nesting Sharp-shinned Hawks

	North America		Midwest	
	Total #	% of Total	Total #	% of Total
DECIDUOUS:				
Unidentified	1			
Maple	2			
Poplar	2			
Willow	1			
Bur Oak	1			
Water Oak	1			
White Oak	1			
Subtotal:	9	24	0	0
CONIFEROUS:				
Unidentified	3			
Hemlock	9	24	7	64
Pine	3			
Ponderosa Pine	2			
Spruce	4	11		
Douglas Fir	3			
Black Spruce	1		1	
White Pine	1		1	
Red Pine	2		2	
Subtotal:	28	76	11	100
TOTALS:	37	100	11	100

Cooper's Hawk

Nest Tree and Habitat Selection

Eleven midwestern tree species and species groups were used for nesting (Table 6). Unidentified deciduous species were most frequently used followed by oak, maple and beech. The remaining nests (17%) were located in conifers, with white pine (66%) used most frequently. Jack and red pine, and white cedar were used equally. Over North America, deciduous nest trees were chosen slightly less often than in the midwest, 81% vs. 83%, but were very important. Unidentified deciduous tree species were the most important nest trees followed by oaks, poplars and cottonwoods, maple, sycamore, beech, cherry, ash and elm. White, red and jack pine were the most frequently used midwestern conifers. Spruces were the second most frequently used tree species group over North America.

In the midwest, 73% of all nests were in deciduous forests; most in "deep forest" (Table 7). Mixed woodlands were second in importance followed by coniferous habitats (6%). Similar trends were evident over North America. Deciduous, riparian-woodland habitats assumed more importance over North America for nesting habitat because of the scarcity of trees in western high plains and prairie areas, except along waterways.

TABLE 5
Sharp-shinned Hawk Nesting Habitat Preferences

	North America		Midwest	
	Total #	% of Total	Total #	% of Total
DECIDUOUS:				
Unidentified Forest Edge	1			
Expansive Forests, Deep Forests, Canyon)Riparian	1			
Moist Forests	1			
Subtotal:	3	9	0	0
CONIFEROUS				
Unidentified	7			
Moist Ravine	2			
Pine Plantations				
Spruce Swamp	1			
Spruce-Fir	1			
Subtotal:	13	37	5	46
MIXED WOODLANDS:				
Mixed Woodland	16			
Thick Conifer Grove	2			
Deep Woods	1			
Subtotal:	19	54	6	55
TOTALS:	35	99.9	11	100

Nest Heights

Midwestern Cooper's Hawk nest heights ranged from 20-70 ft. (\bar{x} 46 ft.) (Table 3). In contrast, North American nests averaged 15% lower (range 15-80 ft.). With the exception of records in the Pacific northwest (which were in the tallest trees), most western and southwestern nests were located at heights nearer the lower end of the nesting height range.

Nests were located above mid-tree and generally a few meters below tree top. Nests in conifers were in upper branches and rested against the main trunk. Nests in deciduous trees were on main limb branch points and horizontally forked limbs.

Productivity

Estimates of average clutch sizes (Table 3) were similar throughout; slightly smaller averages were found in the midwest. Maximum clutch size was 5 eggs. Production over North America may be higher than in the midwest. A maximum of 5 nestlings was recorded.

TABLE 6
Tree Species and Species Groups
Used by Nesting Cooper's Hawks

	North America		Midwest	
	Total #	% of Total	Total #	% of Total
DECIDUOUS:				
Unknown	42	35	30	56
Oak	4		1	
Live Oak	3			
Black Oak	4		4	
Red Oak	4		2	
White Oak	2		2	
Cottonwood	3			
Balsam Poplar	6			
Poplar	4			
Aspen	9			
Beech	2		2	
Elm	1			
Hackberry	1			
Ash	1			
Black Cherry	2		1	
Sugar Maple	5		3	
Black Birch	1			
Shagbark Hickory	1			
Sycamore	3			
Subtotal:	98	81	45	83
CONIFEROUS:				
Unknown	3	3		11
White Pine	6		6	
Red Pine	1		1	
Jack Pine	1		1	
White Cedar	1			
Spruce	4			
White Spruce	2			
White Fir	1			
Douglas Fir	1			
Dead Tree	2			
Subtotal:	22	18	9	17
TOTALS	120	100	54	100

Goshawk

Nest Tree and Habitat Selection

Twenty North American tree species and species groups were utilized (Table 8). Eight were used in the midwest. Deciduous trees were used twice as frequently as conifers over North America, and 9 to 1 over conifers in the midwest. Most important deciduous nesting trees were beech followed by maples, aspen and yellow birch. Eastern white pine was the most frequently used North American conifer followed by spruce, fir, western pines and eastern hemlock. Eastern hemlock and red pine were the most important midwestern conifer nest trees.

TABLE 7

Cooper's Hawk Nesting Habitat Preferences

	North America		Midwest	
	Total #	% of Total	Total #	% of Total
DECIDUOUS:				
Unknown	48	56	32	62
Expansive Forests	2			
Deep Forests	4		4	
Disjuncted but				
Proximal Woodlots	5		1	
Forest Edge Site				
Riparian	5		1	
Subtotal:	67	78	38	73
CONIFEROUS				
Unknown	9	11	3	6
Subtotal:	9	11	3	6
MIXED WOODLANDS:				
Unknown	14		11	21
Riparian	1			
Expansive Forests	1			
Deep Forest				
Forest Edge Site	1			
Subtotal	17	20	11	21
TOTALS:	86	100	52	100

Goshawks preferred mixed woodlands for nesting (Table 9). At both geographic levels, deciduous woodlands were of secondary importance; "pure conifer forests" were least used habitat over North America, and were not used in the midwest. Of the identified deciduous habitats, "thick old growth forests" were used and identified mixed woodland habitats, the so-called "virgin forests" were most frequently used, followed by "deep woods" and "thick conifer groves" in deciduous woods.

Nest Heights

Midwestern Goshawk nests were located an average 6 ft. higher than North America (Table 3) although they were within the same range of heights.

Productivity

Mean clutch sizes and ranges were similar throughout North America, approaching a mean of 3 eggs with a maximum of 4. Two to 3 young per nest were recorded in both the midwest and North America with a maximum of 4.

TABLE 8
Tree Species and Species Groups
Used by Nesting Goshawks

	North America		Midwest	
	Total #	% of Total	Total #	% of Total
DECIDUOUS:				
Unknown	6		2	
Yellow Birch	4		1	
Beech	16	22	10	45
Maple	11	15	4	18
White Birch	2			
Aspen	6		2	
Silver Maple	1			
Poplar	1		1	
Cottonwood	1			
Libocedrus	1			
Subtotal:	49	67	20	91
CONIFEROUS:				
Unknown	2			
White Pine	9	12		
Hemlock	2		1	
Engellman Spruce	2			
Norway Spruce	1			
Ponderosa Pine	2			
Pine	2			
Lodgepole Pine	1			
Douglas Fir	2			
Red Pine	1			
Subtotal:	24	33	2	9
TOTALS:	73	100	22	100

Red-Shouldered Hawk

Nest Tree and Habitat Selection

Red-shouldered Hawk nests were found in 37 different tree species or species groups over North America (Table 10). By far, deciduous trees were more important than conifer and miscellaneous nest trees throughout North America. Most important midwestern deciduous tree species were beech and oaks, followed by maple. White pine was the most important midwestern conifer. However, the high importance of unidentified midwestern trees should not be overlooked. Throughout North America, oaks were the most frequently used followed by beech, unknown deciduous, sycamore, and eucalyptus. Some of the less frequently used upper midwestern species (or species groups) used in other areas of North America include yellow and paper birch, aspen, black cherry, ironwood, elm and ash.

Midwestern hawks did not nest in coniferous woodlands (Table 11) and only 5% of 155 nests reported in North America were in this habitat. Riparian coniferous habitats were the most important of the conifer forests and riparian deciduous forest habitats were important throughout North America. Mixed riparian woodlands were also important over North

TABLE 9

Goshawk Nesting Habitat Preferences

	North America		Midwest	
	Total #	% of Total	Total #	% of Total
DECIDUOUS:				
Unknown	16		7	
Expansive Forests				
Deep Forests	1			
Virgin Forests				
Riparian				
Thick Growth	2			
Old Growth	2			
Large Second Growth	1			
Subtotal:	22	34	7	30
CONIFEROUS:				
Unknown	9			
Spruce Fir	2			
Spruce-Pine	1			
Spruce Swamp				
Hemlock Grove				
White Pine Grove				
Large Second Growth	2			
Subtotal:	14	22	0	0
MIXED WOODLANDS:				
Mixed Woodland	18		11	
Thick Conifer Grove	2		1	
Deep Woods	3			
Virgin Forest	5		4	
Subtotal:	28	44	16	70
TOTALS:	64	100	23	100

America. Red-shouldered Hawks preferred deciduous forests slightly over mixed woodlands in the midwest, whereas over North America, deciduous woodlands were strongly favored over mixed woodlands.

Nest Heights

Midwestern nests were recorded over a narrower range of heights and found at lower levels (43 ft.) than over North America (47 ft.) (Table 3). Nests were located on main limb forks usually near 2/3 the maximum height of the tree.

Productivity

Midwestern clutches were larger than over North America. Nestling production was higher in the midwest but more variable than North America. Maximum number of nestlings was 1 larger over North America.

TABLE 10
 Tree Species and Species Groups
 Used by Nesting Red-shouldered Hawks

	North America		Midwest	
	Total #	% of Total	Total #	% of Total
DECIDUOUS:				
Unknown	29	12	23	43
Pin Oak	6			
Willow Oak	1			
Red Oak	8		4	
White Oak	9		2	
Oak	22	9	2	
Live Oak	9			
Black Oak	4		1	
Bur Oak	1		1	
Beech	43	18	10	19
White Birch	8			
Yellow Birch	3		1	
River Birch	1			
Cottonwood	1		1	
Poplar	2		1	
Aspen	1		1	
Sweetgum	9			
Hickory	1			
Black Cherry	1			
Sycamore	27	11	1	
Silver Maple	1			
Maple	6		3	6
Mahogany	1			
Tulip Tree	5		1	
Ironwood	1			
Eucalyptus	13	5		
Buttonwood	1			
Willow	1			
Ash	1		1	
Elm	1			
Subtotal:	217	91	52	96
CONIFEROUS:				
Unknown	1		1	
Dwarf Cypress	1			
Austrian Pine	7	3		
White Pine	2		1	
Pine	4			
Loblolly Pine	2			
Hemlock	1			
SUBTOTAL	18	8	2	4
MISCELLANEOUS:				
Royal Palm	3			
Subtotal:	3	1	0	0
TOTALS:	283	100	54	100

TABLE 11
Red-shouldered Hawk Nesting Habitat Preferences

	North America		Midwest	
	Total #	% of Total	Total #	% of Total
DECIDUOUS:				
Unknown	74	48	20	43
Expansive Forests			1	
Deep Forests	1		1	
Riparian	32	21	5	11
Subtotal:	107	69	27	57
CONIFEROUS:				
Unknown	3			
Ravine Moist Forest				
Riparian				
Subtotal:	7	5	0	0
MIXED WOODLANDS:				
Mixed Woodland	30		20	43
Thick Conifer Grove	1			
Riparian	7			
Subtotal:	38	24	20	43
MISCELLANEOUS				
	3			
Subtotal	3	2	0	0
TOTALS	155	99.9	47	100.4

TABLE 12
Tree Species and Species Groups
Used by Nesting Merlin

	North America		Midwest	
	Total #	% of Total	Total #	% of Total
DECIDUOUS:				
Aspen	5			
Maple	2			
Subtotal:	7	58	0	0
CONIFEROUS:				
Unknown	1			
Spruce	1			
Jack Pine	1			
White Spruce	1			
Scotch Pine	1			
Subtotal:	5	42	0	0
TOTALS:	12	100	0	0

TABLE 13

Merlin Nesting Habitat Preferences

	North America		Midwest	
	Total #	% of Total	Total #	% of Total
DECIDUOUS:				
Unknown	1			
Open Prairie	3			
Aspen Parkland	5			
Associated with Human Habitation	3			
Subtotal:	12	71	0	0
CONIFEROUS:				
Unknown	1			
Spruce-Pine Forest	1			
Riparian	1			
Plantation	1			
Subtotal:	4	24	0	0
MIXED WOODLANDS:				
Mixed Woods	1			
Subtotal	1	6	0	0
TOTALS	17	100	0	0

*Merlin***Nest Tree and Habitat Selection**

Merlins nested in 7 tree species or species groups throughout North America (Table 12). Deciduous trees were slightly more important than conifers. The most frequently used nest tree was aspen, followed by maple, pine and spruce. Most frequently used habitats were deciduous woodlands, parkland, open prairies, and trees associated with human habitations (Table 13). Coniferous habitats were second in importance and mixed woodlands were the least.

Average height was 18 ft. (range 5-35 ft.) over North America (Table 3). No data were available specific to the midwestern states.

Productivity

A maximum clutch size of 4 eggs, and an average of 2.5 eggs were recorded over North America. Nearly 3 nestlings are produced per nest over North America.

TABLE 14
Marsh Hawk Nesting Habitat Preferences

	North America		Midwest	
	Total #	% of Total	Total #	% of Total
WETLANDS:				
Marsh Meadow:				
Bushes, Brush	8		7	
Mostly Willow & Grasses; Sedge, Willow, Milkweed,	43	6	41	
Aspen, <i>Solidago</i> , Canary, Grass, <i>Spiraea</i> , Nettle Aster and <i>Poa</i>	54	8	54	
Snowbush, Snowberry, Raspberry, Rosebush	11		1	
Sawgrass, Marshgrass	3		1	
Subtotal:	119	17	104	34
Freshwater Marsh:				
Tall Grasses, Reeds and Bullrushes near shore	51	7	19	
Sedge, Leatherleaf, Sphagnum Moss, Rushes and Centrum	26	4	5	
Cattail, Rushes	36	5	27	
Subtotal:	132	18	56	18
Brackish Water Marsh:				
Salt Grass, <i>Salicornia</i> Baccharis, Cord Grass	11		0	
Bog:				
Tamarack, Spruce Dwarf Birch, Labrador Tea, Jackpine, Sphagnum Moss	24	3	1	
Creek Bank:				
	2		0	
Dry Pothole, Dry Slough:				
Cattail, Bullrush	12		0	
Swamp:				
Tamarack, Birch	3		12	
Subtotal:	52	7	13	4

Northern Harrier

Nest Site and Habitat Selection

A minimum of 27 different vegetation associations were used by Harriers. These were divided into 2 general categories: wetlands, with 7 subcategories, and dryland habitats, with 9 subcategories (Table 14). In the midwest, wetland marsh meadows dominated by sedges, willows, grasses and occasional aspen were the most frequently used habitats, followed by

TABLE 14
Marsh Hawk Nesting Habitat Preferences
(continued)

	North America		Midwest	
	Total #	% of Total	Total #	% of Total
DRY LANDS:				
Cultivated Fields:	59	8	7	2
Hay, Alfalfa, Wheat Rye, Fallow Situations, Oats				
Pasture & Uncultivated Fields:	22	3	5	2
Rosebushes, Grasses, Blackberry				
Grassland:	102		12	
Western Wheatgrass, Green Needlegrass, Yellow & Sweet Clover	11		2	
Timothy, Alfalfa, Prairie Grasses, Aster, <i>Poa</i> , Sand Bluestem, Switchgrass, Nettle & Thistle & <i>Centrum</i>	21		14	
Quack Grass	16		16	
Brome Grass	22		4	
Goldenrod	18		18	
Subtotal:	271	38	78	25
Sage/Cold Desert Rangeland:	5		0	
Bushy, Deciduous Brush:	29	4	20	7
Deciduous Woods:	13		6	2
Willow, Oak, Dogwood, Pine				
Stubble:	7		0	
Buckbrush Rangeland (Prairie):	34	5	0	
Unknown:	59		30	
Subtotal:	147	20	56	18
TOTALS:	721	100	307	100

dryland grasslands, fresh water marshes, deciduous brushy areas, cultivated fields of hay, wheat and fallow fields, deciduous woods, and pasture and uncultivated fields. Most frequently used habitats over North America were marsh meadows and fresh water marshes dominated by rushes, sedges and grasses, followed by dryland grasslands, cultivated fields, buckbrush/rangeland prairies, bushy deciduous growth, boglands dominated by tamarack, spruce, sphagnum moss and pasture and uncultivated fields. Open areas and slightly closed forest areas, both wetlands and drylands, dominated by thick grass growths and graminoid plants, were the most important nesting habitats of the North American Harrier and they used only ground nesting sites.

Productivity

Average clutch sizes approached 4 eggs and ranged from 1-7 eggs (Table 3). Harrier nestling productivities were also similar throughout North America with ranges of 1-6 young per nest and an average of nearly 3 per nest.

Discussion

Even though the problems of non-standardized and subjective terminology were used on card reports, some results are in agreement with our field experiences in the Ottawa National Forest (Apfelbaum, 1979). Preliminary field work, for example, has revealed elm and sugar maple, 2 important Barred Owl nest trees, to agree with card data. Observations concur on the importance of riparian deciduous forest habitats for this species. Field observations of Goshawk nesting habitat support the conclusions of the card program data. We have found nests in maple, aspen, and yellow birch; suggested important nest trees by card records. Similar results were found for the other raptors studied.

Because this study did not include intensive field work, we are unable to compare field and card file data for productivity. However, comparison of card data with literature records is given as an example. A notable discrepancy is in the estimation of Merlin productivity. Cornell data suggested a maximum clutch size of 4 eggs and average of 2.5 eggs per nest for the Eastern Taiga Merlin. However, mean clutch sizes for this same subspecies of Merlin have been measured at 4.5 (N=2), with 2.2 (N=6) nestlings per nest (Fox, 1971; Temple, 1972). Northern and central forest breeders lay 4.5 (N=2) eggs per nest and produce 4 (N=5) nestlings. Cornell records suggested 3 nestlings are produced per nest (N=21). The card records may be more accurate because of the larger sample size. However, this may result from lumping data over all North American populations for which data was available from cards. The literatures and Cornell data base do, however, suggest similar habitat, nest tree species, and nesting heights for this species as well as the others studied.

The Cornell data are in agreement with the clutch sizes for the Red-shouldered Hawk (Henny, 1972). Both studies also suggest midwestern and populations in other areas of the United States have the same general habitat requirements.

Cornell data indicate "larger older growth trees" in "older growth forests" to be important nesting habitats for 6 of the 7 species studies. The Cornell data, by suggesting the importance of American elm to some nesting raptors, hints as to the possible effects of an increased elm mortality on nesting raptors. Dutch elm and phloem necrosis diseases only recently invaded the Ottawa National Forest. Maintenance of older age stands of another suitable nesting tree should be a forest management goal. Potential declines of Barred Owl populations, because of declining elms, may be offset by silvicultural selection for older maple, yellow birch, and possibly aspen. These species also occur in the Ottawa National Forest, and as indicated by the Cornell records, are important nest trees in the midwest.

The data in the Cornell nest record card files have provided us some data necessary for raptor management in the Upper Peninsula of Michigan. It may serve equally valuable for other areas of the country.

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RAPTOR COLLISIONS WITH UTILITY LINES**A Call for Information**

The U.S. Bureau of Land Management, Sacramento, in cooperation with the Pacific Gas and Electric Company, is assembling all available published and unpublished information concerning collisions of raptors with power lines and other utility lines. Actual case histories — no matter how circumstantial or fragmentary — are needed. Please acknowledge that you have such information by writing to Dr. Richard R. (Butch) Olendorff, U.S. Bureau of Land Management, 2800 Cottage Way, Sacramento, California 95825 U.S.A. (Phone (916) 484-4541). A form on which to record your information will then be sent by return mail.

Request for Assistance

Adult and nestling Turkey Vultures in Wisconsin are being marked with green patagial wing tags during 1983 and 1984, as part of a study of nest and roost fidelity, feeding ranges, and migration. Tags are encoded with a small "U" and large white numerals, 1-99. If marked vultures are sighted, please report date, location, tag number, whether tag is on right or left wing, and other pertinent observations to the Bird Banding Laboratory, U.S. Fish and Wildlife Service, Laurel, Maryland 20811, and to Madison Audubon Society, Rt. 1 Box 128A, Arlington, WI 53911.